

# The impact of COVID-19 pandemic restrictions on physical activity and psychological characteristics of the Iranian people

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## Research Article

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## Abstract

# Background

The aim of this study was to investigate the impact of the COVID-19 pandemic restrictions on physical activity behaviours, as well as on mental health indicators among Iranian people.

## Methods

In this cross-sectional study, 335 participants were included (155 males, mean age =  $30.06 \pm 14.58$  years). The eligibility criteria for this study were as follows; 1- Having at least 10 years of age. 2- Having a minimum literacy rate 3- Ability to work with networks of smart communication devices such as smartphones and computers 4- Living in Iran for the past 5 years. Participants were selected through the convenience sampling and filled out an online questionnaire measuring physical activity behaviours (The International Physical Activity Questionnaire; IPAQ; Short Form) and two mental health indicators – self-esteem (Rosenberg self-esteem scale) and social physical anxiety (*7-items social physique anxiety scale*).

## Results

The results of Wilcoxon test showed that participants reported significant differences from before to during the pandemic in all three variables of physical activity (significant decreases), self-esteem (significant decreases), and social physical anxiety (significant increases). This difference was found, regardless of participants' gender. The results of Spearman correlation test between changes in physical activity and changes in mental health indicators showed that COVID-19 pandemic negatively impacted self-esteem and social physical anxiety. However, we have not found any significant association of physical activity's change with social physical anxiety or self-esteem's changes before and during the pandemic.

## Conclusions

In sum, the findings of the present study indicate a detrimental effect of the COVID-19 pandemic on the physical activity and mental health among Iranian's people. Public policies aiming to buffer the negative impact on COVID-19 Iranians' health are urgently needed.

## Background

Coronavirus-19 (COVID-19) is a highly contagious disease caused by acute respiratory syndrome [1]. The disease was first observed in mid-December 2019 in Wuhan, China. Since the outbreak of the virus, the number of reported cases has increased rapidly and has affected the whole world. On January 30, 2020, the World Health Organization (WHO) affirmed the disease as "an international public health emergency" [2]. By the end of July 2021, more than 192 million people worldwide has been infected by the disease, of which more than 4 million people have died (World Health Organization, 2021) [3]. During this period, the WHO advised people to maintain social distance, use masks, to avoid public places such as restaurants, sports clubs, shops and stores, etc., and to cooperate with the WHO and local governments to avoid escalation of this disease [3]. As the coronavirus intensified, people were instructed to leave their home for very limited purposes, such as shopping for food or seeking medical attention. As a result, most sports venues and clubs were closed [4]. In other words, the reduction of physical interaction, known as social or physical distance, has been considered as the first line of defence against this pandemic [5]. However, such social distances, or even temporary quarantines, can

themselves have adverse effects on other facets of individuals' lives: such as their physical activity (PA) and mental health [6].

Iran is also one of the countries deeply affected by the COVID-19 pandemic. According to the WHO, by the end of July 2021, about 3,623,840 (4.37% of the whole Iranian population) cases have been affected by coronavirus and 88,066 (0.10%) persons have died in Iran [3]. Despite this situation, by the end of July 2021, just over 2,268,826 (2.73%) people had been vaccinated [7]. By this severe spread of the virus in Iran and low pace of vaccination in this country, as well as social and physical restrictions and temporary quarantines, it seems that this country has been severely faced with the subsequent physical and psychological consequences of this pandemic [3]. Undoubtedly, the COVID-19 pandemic has had several effects on individuals' behaviours [8].

According to reports and researches, critical situations and pandemics may affect differently the PA and mental health of people at different levels of society such as patients, health care workers, families, children, students, and even athletes [2, 5, 9, 10]. For example, when a negative event occurs in life, states of anxiety and stress perception are exacerbated by a lack of relationship with others due to social distance [11]. In other words, the current emergency situation that combines both the stress due to COVID-19 with social isolation may have an important emotional and physical impact [12, 13].

The positive effects of regular PA on many health outcomes have been well established [14], and studies have observed this link during the COVID-19 [9]. In addition, exercising regularly and maintaining a lifestyle during quarantine is crucial to prevent future chronic illnesses due to sedentary habits [5]. However, research has shown that engagement in PA may have decreased during the COVID-19 pandemic [6, 15]. For example, Amini et al. [15] reported that the physical activity level of Iranian people decreased before and during the COVID-19 pandemic.

Furthermore, concerning emotional factors, researchers have also shown that quarantine and isolation can also lead to anxiety [16–18]. One of these types of anxiety variables is social physical anxiety. Social physical anxiety is a social psychological variable that is influenced by theories of self-expression and management and it assesses a person's perceived anxiety about presenting his body and figure when they are in front of others [19]. Social physical anxiety is mainly associated with some of the prominent psychological and behavioural factors associated with health. For example, social physical anxiety is associated with variables such as physical self-esteem [20], body image [21] and levels of PA [22]. Social physical anxiety like other types of anxieties appears to increase during the COVID-19 pandemic [23, 24]. In addition to this variable, self-esteem as another psychological variable can be affected in this situation [25]. Self-esteem can be defined as person's self- assessment [26]. This variable is important for a successful and satisfying life and is an essential aspect of psychological well-being. Research has shown a positive relationship between PA and individual's self-esteem [27]. In the present study, we tried to pay attention to these physical and psychological variables and evaluate the impact of the COVID-19 pandemic on them. To date, however, much research has been conducted worldwide on the impact of the COVID-19 pandemic on levels of PA and mental health [6, 28–30]. Also, there is little information about this, especially for Iran [31]. Therefore, this study is designed to achieve the following two goals. First, this study aimed to compare the level of physical activity and other psychological indicators such as self-esteem and social physical anxiety before (i.e., retrospectively assessed) and during the COVID-19 pandemic. This procedure will give us a better understanding of the adverse effects of pandemics on PA and psychological states in Iran. In the second step, this study aimed to examine how changes in PA are associated with mental health indicators such as self-esteem and social physical anxiety before and during the COVID-19 pandemic.

## **Materials And Methods**

### **Study design and setting**

The present study was a cross-sectional web-based study and was performed on a cohort group of Iranian citizen in the spring of 2021. In this study, participants answered the web-based questionnaires of physical activity, self-esteem and social physique anxiety. In these electronic questionnaires, individuals were asked to answer questions in two time periods before and during the pandemic.

## Participants

Participants were 335 Iranian citizen (155 males with a mean age of  $33.70 \pm 14.72$  years and 180 females with a mean age of  $26.92 \pm 13.74$  years) with a mean age of  $30.06 \pm 14.58$  years. They were selected through available sampling for this study and filled out an online questionnaire after expressing their consent to participate and they had the option to withdraw from the study at any time. They were from different parts of Iran. The eligibility criteria for this study were as follows; 1- Having at least 10 years of age. 2- Having a minimum literacy rate 3- Ability to work with networks of smart communication devices such as smartphones and computers 4- Living in Iran for the past 5 years.

## Scales

The International Physical Activity Questionnaire (IPAQ; Short Form)

The IPAQ was used to measure participants' physical activity [32]. This questionnaire is designed to be used among adults aged 18 to 65 years [33]. The way of scoring is that activities such as aerobics, high-speed cycling, mountaineering and basketball, which require more than 6 calories per minutes of energy, are classified as intense activities. Activities such as volleyball, badminton, and room cleaning, which require 3 to 6 calories per minute, are classified as moderate activities. Any activity that is less than ten minute is not considered [32]. Scores for sitting time during the week are calculated separately and are not included in the final score estimate. Each Metabolic Equivalent Task (MET) minutes per week represents the amount of energy consumed for physical activities per week. To obtain the continuous variable score of the IPAQ, it is sufficient to multiply the number of days in the time related to physical activity, as well as the number of METs per week to calculate the amount of energy consumed for physical activity. Since this tool measures physical activity in three categories: low activity level, moderate activity level and intense activity level, each of the mentioned activity intensities will have a different weight. For example, the weight of walking will be 3.3, the weight of moderate activity will be 4 and the weight of intense activity will be 6. The final score of PA is the sum of scores related to the three categories of low activity level, moderate activity level, and intense activity level [34].

## Self-esteem scale

The Rosenberg self-esteem scale (1965) measures a person's overall self-esteem [35]. This scale includes 10 general terms that measures the level of life satisfaction and a good feeling about oneself; for example, the first question was as follows: "On the whole, I am satisfied with myself". Participants had to answer this question using the 4-point Likert scale, from strongly agree to strongly disagree. This tool is a common and valid tool for measuring self-esteem in all over of the world. This scale has a higher correlation than the Coopersmith self-esteem questionnaire and has a higher validity in measuring self-esteem levels [36]. In another study, the internal consistency of this scale was reported to be appropriate and about 0.74 [27]. Cronbach's alpha was observed 0.86 in the current sample.

## Social physical anxiety scale

The social physical anxiety scale [37] consists of seven items, for example: "I sometimes get upset because I think others judge my weight or fitness negatively. In response to each question, participants use the 5-point Likert scale as: 1 (never) to

5 (always). Higher scores indicate higher levels of social physical anxiety. However, question number 5: I feel empowered about how others evaluate my body; it is scored in reverse [38]. Sáenz-Alvarez et al. [38] reported the validity and reliability of this tool as appropriate. The researchers reported that the internal consistency of the instrument was about 0.85 via Cronbach's alpha. Cronbach's alpha was observed 0.81 in the current sample.

## Procedure

After approving the research plan in the ethics committee in the research of the department of motor behaviour and sports psychology of Shahid Chamran University of Ahvaz (16032021), the researchers designed an electronic questionnaire in the form of Google Form online survey. The time to complete the questionnaire was about 10 minutes. The online questionnaire consisted of four parts. In the first part, demographic information such as age, gender, level of education, marital status and employment status were asked. In the second part, there were questions related to the IPAQ. In the third part, questions about the participants' self-esteem were asked, and at the end, there were questions related to the social physique anxiety scale. The questionnaire was provided to the participants in the spring of 2021 for 15 days and they were asked to answer the mentioned questions in two periods before the outbreak of coronavirus (early winter 2020) and the period during the outbreak of coronavirus (spring 2021). Finally, 335 questionnaires were accepted among the answered and complete questionnaires and entered the final analysis.

## Data analysis

Statistical analysis was performed using SPSS software version 26. To analyse the data collected through questionnaires, first, preliminary analyses were conducted, such as testing for normality using the Kolmogorov-Smirnov test, and then descriptive statistics were used to describe the data extracted from the questionnaires. According to the purpose of the study, initially the collected data were compared in the two time periods before and during the outbreak of coronavirus. This comparison was performed in both gender of men and women in general. Considering that another purpose of the present study was to investigate the relationship between changes in PA and mental health indicators from before the pandemic to the during of it, the residualized change scores were obtained by regressing scored variables during pandemic (e.g., PA during the pandemic) on their respective variables before pandemic (e.g., PA before the pandemic) [39].

## Results

The results of descriptive statistics showed that, most of participants were single (200 participants, 59.07%) and the rest were married (135 people, 40.03%). Almost most of them (211 participants, 63%) had a university degree. The rest of the participants (124 participants, 37%) had a high school diploma. One hundred twelve (33.4%) of the respondents were students, 132 (39.4%) were employees, and the rest of the participants were employed in freelance and private jobs (91 participants, 27.1%). Preliminary findings also revealed that the extracted data from the questionnaires did not follow a normal distribution; therefore, the researchers used non-parametric statistics to analyse the data. Wilcoxon test was first used to compare the groups in the two time periods before and during the pandemic. The results of this test showed that the participants of the present study reported a significantly lower overall level of PA and self-esteem from before to during the COVID-19. These differences were consistent in both genders (Table 1). The results of Spearman correlation test indicated a significant negative relationship between self-esteem and social physical anxiety changes from before to during of COVID-19 pandemic. This significant negative relationship was observed in both genders. However, the results did not show any significant association between changes in PA and in social physical anxiety as well as with changes in self-esteem, from before and during coronavirus (Table 2 and Fig. 1).

Table 1

Wilcoxon test results for comparison of research variables in two time periods before and during coronavirus pandemic.

| <b>Variables</b>  |                    |                          |                          |                       |                       |               |                 |                                |
|-------------------|--------------------|--------------------------|--------------------------|-----------------------|-----------------------|---------------|-----------------|--------------------------------|
| Gender            | Statistics         | Intense PA<br>(min/week) | Moderate<br>PA(min/week) | Walking<br>(min/week) | Sitting<br>(min/week) | Overall<br>PA | Self-<br>esteem | Physical-<br>social<br>anxiety |
| Female            | Z                  | -4.29                    | -5.05                    | -4.25                 | -7                    | -5.51         | -6.47           | -6.14                          |
|                   | Significance       | 0.0001 *                 | 0.0001 *                 | 0.0001 *              | 0.0001 *              | 0.0001 *      | 0.0001 *        | 0.0001 *                       |
|                   | effect size<br>(r) | 0.23                     | 0.27                     | 0.23                  | 0.38                  | 0.30          | 0.35            | 0.33                           |
| Male              | Z                  | -6.05                    | -5.67                    | -4.87                 | -7.62                 | -6.67         | -3.47           | -8.11                          |
|                   | Significance       | 0.0001 *                 | 0.0001 *                 | 0.0001 *              | 0.0001 *              | 0.0001 *      | 0.0001 *        | 0.0001 *                       |
|                   | effect size<br>(r) | 0.33                     | 0.30                     | 0.26                  | 0.41                  | 0.36          | 0.18            | 0.44                           |
| Total             | Z                  | -7.33                    | -7.57                    | -6.41                 | -10.35                | -6.41         | -7.28           | -9.98                          |
|                   | Significance       | 0.0001 *                 | 0.0001 *                 | 0.0001 *              | 0.0001 *              | 0.0001 *      | 0.0001 *        | 0.0001 *                       |
|                   | effect size<br>(r) | 0.40                     | 0.41                     | 0.35                  | 0.56                  | 0.35          | 0.39            | 0.54                           |
| * Notes: p < 0.05 |                    |                          |                          |                       |                       |               |                 |                                |

Table 2

Results of Spearman rank correlation test to investigate the relationship between changes in variables, based on residualized scores.

|  | Gender  | Research variables        | Over-all PA (day*min*MET)   | Self-esteem                   |
|--|---------|---------------------------|-----------------------------|-------------------------------|
| Changes scores (residualized scores) before and during the pandemic. | Females | Over-all PA (day*min*MET) | -                           | -                             |
|  |         | Self-esteem               | -0.055[95%CI: -0.16;0.05]   | -                             |
|  |         | Physical-social anxiety   | 0.107[95%CI: -0.01; 0.21]   | -0.369**[95%CI: -0.46; -0.27] |
|  | Males   | Over-all PA (day*min*MET) | -                           | -                             |
|  |         | Self-esteem               | -0.149[95%CI: -0.25; -0.04] | -                             |
|  |         | Physical-social anxiety   | 0.019[95%CI: -0.09; 0.13]   | -0.285**[95%CI: -0.38; -0.18] |
|  | Total   | Over-all PA (day*min*MET) | -                           | -                             |
|  |         | Self-esteem               | -0.095[95%CI: -0.02; 0.01]  | -                             |
|  |         | Physical-social anxiety   | 0.083[95%CI: -0.02; 0.19]   | -0.337**[95%CI: -0.43; -0.24] |
| ** Notes: p < 0.01   |         |                           |                             |                               |

## Discussion

This study is one of the first studies in Iran that not only examines the impact of the COVID-19 pandemic on the level of PA, but also examines other psychological variables such as self-esteem and social physical anxiety during the COVID-19 pandemic. Specifically, this study had two objectives. First, it aims of to compare PA levels, self-esteem and social physical anxiety of the participants from before to during the COVID-19 pandemic. Second, it aims to investigate the relationship between changes in these variables, from before to during the COVID-19 pandemic.

As predicted, the results showed that all the measured indices were different before and during the pandemic, lower levels of PA and self-esteem and higher levels of social anxiety from before to during the COVID-19. Contrary to our hypothesis, we only found one significant negative association between self-esteem of individuals and their physical social anxiety (higher self-esteem was associated with lower physical social anxiety) both on the changes scores from before to during the COVID-19. However, PA changes were associated neither with self-esteem nor with physical social anxiety changes.

The findings indicating detrimental effects of the COVID-19 pandemic on the levels of PA and of psychological indicators are in line with previous studies [6, 28–30]. For example, Di Franco et al. [10] in their study examined the effects of social distance on mental status and PA during the COVID-19 pandemic. In their study of 1,132 Italian athletes, the researchers concluded that the COVID-19 pandemic had a negative effect on perceived stress as well as psycho-biological and social conditions.

Amini et al. [15], in their research, show that the COVID-19 pandemic negatively affected the level of PA of Iranian individuals. Therefore, the findings of the present study, in line with the findings of Amini et al. [15], show that the level of PA of the Iranian people has decreased significantly compared to the time before the pandemic. The results of this study also showed that the level of sedentary behaviours (the amount of time people spend sitting) has increased significantly. These changes are seen in both genders. Amini et al. [15] also observed the negative effects of pandemics in both genders. However, others have shown that the pandemic has mainly affected the intensity of PA and not its frequency in Iran [31].

In another study, Cheval et al. [9] examined the association between PA change, sedentary behaviour, and mental health during the coronavirus pandemic in France and Switzerland. In their study, participants also answered online questionnaires that measured PA, mental and physical health, anxiety and depressive symptoms. Their findings show that the COVID-19 pandemic, although leading to a decrease in vigorous activity as well as an increase in sedentary behaviour among the population, the amount of moderate PA or walking among individuals have also increased. In the present study, PA in all its indicators such as moderate and vigorous PA, walking and over-all PA score decreased during the COVID-19 pandemic period compared to before. The findings of the present study are consistent with the findings reported by Cheval et al. [9] regarding vigorous PA, but the results are in contrast with their findings on other indicators such as moderate PA and walking. These differences can be explained considering the culture of sports and PA among the participants. We can speculate that people in developed countries such as France and Switzerland are more likely than people in countries like Iran to employ benefits of PA to improve their own physical and psychological health. Another possible reason for the decrease in PA of the participants of the present study after the pandemic is the type of occupation of individuals. As reported in the results and participants sections, the majority of those who participated in the present study were either students and university students or government employees. Universities and schools were closed during the COVID-19 pandemic. Virtual and distance education were implemented to replace traditional teaching strategies. In addition, for employees, telecommuting has replaced attendance at work. Overall, it seems that these frequent and long stays at home, as well as the available stress and fear of leaving home, all led to increased sedentary behaviours and less presence in sports places.

Although the results of the present study did not show any significant relationship between PA changes and other psychological indicators such as self-esteem and social physique anxiety changes, they indicated a significant and negative relationship between self-esteem and social physique anxiety. To explain this finding, it can be said that high self-esteem has probably reduced concerns about weight and appearance of people in social situations and therefore has reduced the level of social physique anxiety [20]. This relationship has been established in this study.

In the present study, decreased self-esteem and increased post-pandemic social physique anxiety were reported. Research has shown that with the onset of the COVID-19 pandemic, people's use of social networks such as Instagram has increased dramatically [40]. On the other hand, it has been found that there is a relationship between the use of social networks and increased body dissatisfaction and reduced self-esteem [40]. Therefore, the reported decrease in self-esteem, as well as the increase in levels of social physique anxiety among the sample studied in the present study, can be attributed to the possible increase in people's use of social networks, especially Instagram. In the present study, the use of social networks has not been measured. It is suggested that future research measures the use of social networks during the pandemic and compares it with before the pandemic, to examine the impact of the pandemic address the level of PA and indicators of mental health such as self-esteem and social physique anxiety.

PA is an essential part of a healthy lifestyle that can prevent or manage chronic diseases, facilitate daily life activities, and also maintain physical function in people, especially the elderly [9]. In other words, PA can be associated with a myriad of positive physical and mental health consequences [9]. However, since the results of the present study could not show a relationship between the level of PA and other psychological variables, it is suggested that the findings of this study should be applied more cautiously. Therefore, governments especially the government of Iran, with the help of experts in the field of sports and health should create conditions allowing individuals to participate in sports and PA with more motivation

and facilities. They could also aim to prevent the accumulation of sedentary behaviours, which are associated with detrimental mental and physical problems.

This study is one of the first studies in an Iranian sample which investigates the impact of the COVID-19 pandemic on the level of PA and on some psychological variables. However, the results of the present study have several potential limitations. First, the study results are limited by the traditional limitations of cross-sectional study designs. For example, one of the limitations of the present study was the retrospective assessment of variables in reference of the before-lockdown period. In this study, participants were asked to report their level of physical activity and psychological indicators in the two time periods before and during the COVID-19 pandemic. Although post-pandemic questions coincided with research implementation, pre-pandemic questions were retrospective and past-related. The next limitation of the present study can be attributed to the geographical scope of the respondents who completed the web-based questionnaire. This dispersion may not be the same throughout the country in different regions and may be more specific to a particular part of the country (In the present study, participants were from different cities of Iran, but most of them were from Khuzestan, Tehran, Alborz and Kurdistan provinces). Another limitation of the present study was that it was a web-based one. Mainly, some people could not participate in this study due to lack of Internet access, absence in cyberspace or lack of knowledge to complete the questionnaires of this study. Therefore, the findings of the present study should be used with more caution. Due to the above-mentioned limitations, it is suggested to conduct other researches, which may tackle those limitations.

## **Conclusions**

The findings of this study showed that the pandemic was associated with lower the levels of PA among the Iranian people, and with lower self-esteem and higher physical social anxiety. However, unlike previous studies, we did not observe a significant association of PA with self-esteem and social physical anxiety. Future large-scale studies and with a more heterogeneous sample of Iranian people should be conducted to further examine the expected protective role of physical activity on mental health outcomes. Meanwhile, public policies aiming to buffer the negative impact on COVID-19 Iranians' health are urgently needed.

## **Declarations**

### **Ethics approval and consent to participate**

Before the start of this web base study, informed consent was obtained from all participants. This study was approved by the Ethics Committee at the department of motor behavior and sports psychology of Shahid Chamran University of Ahvaz (16032021). All methods were carried out in accordance with relevant guidelines and regulations.

### **Consent for publication**

No individual or indemnifiable data is being published as part of this manuscript.

### **Availability of data and materials**

The datasets generated and analyzed during the current study are not publicly available due to ethical restrictions, however, they are available from the corresponding author on reasonable request.

### **Competing interests**

The authors declare that the present study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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### Authors' contributions

Conceptualization, E.S.; H.G and S.A.; methodology, E.S.; A.P; software, F.I.; validation, G.B., F.M.C. and W.R.G.; formal analysis, H.G; investigation, E.S.; resources, G.B; H.N; data curation, A.P; F.I; S.A; writing—original draft preparation, E.S.; writing—review and editing, G.B. and A.F.S. visualization, E.S.; G.B; H.G; A.P; F.I; F.M.C; H.N.; A.F.S.; S.A; supervision, G.B; project administration, E.S; funding acquisition, H.N. All authors have read and agreed to the published version of the manuscript.

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## References

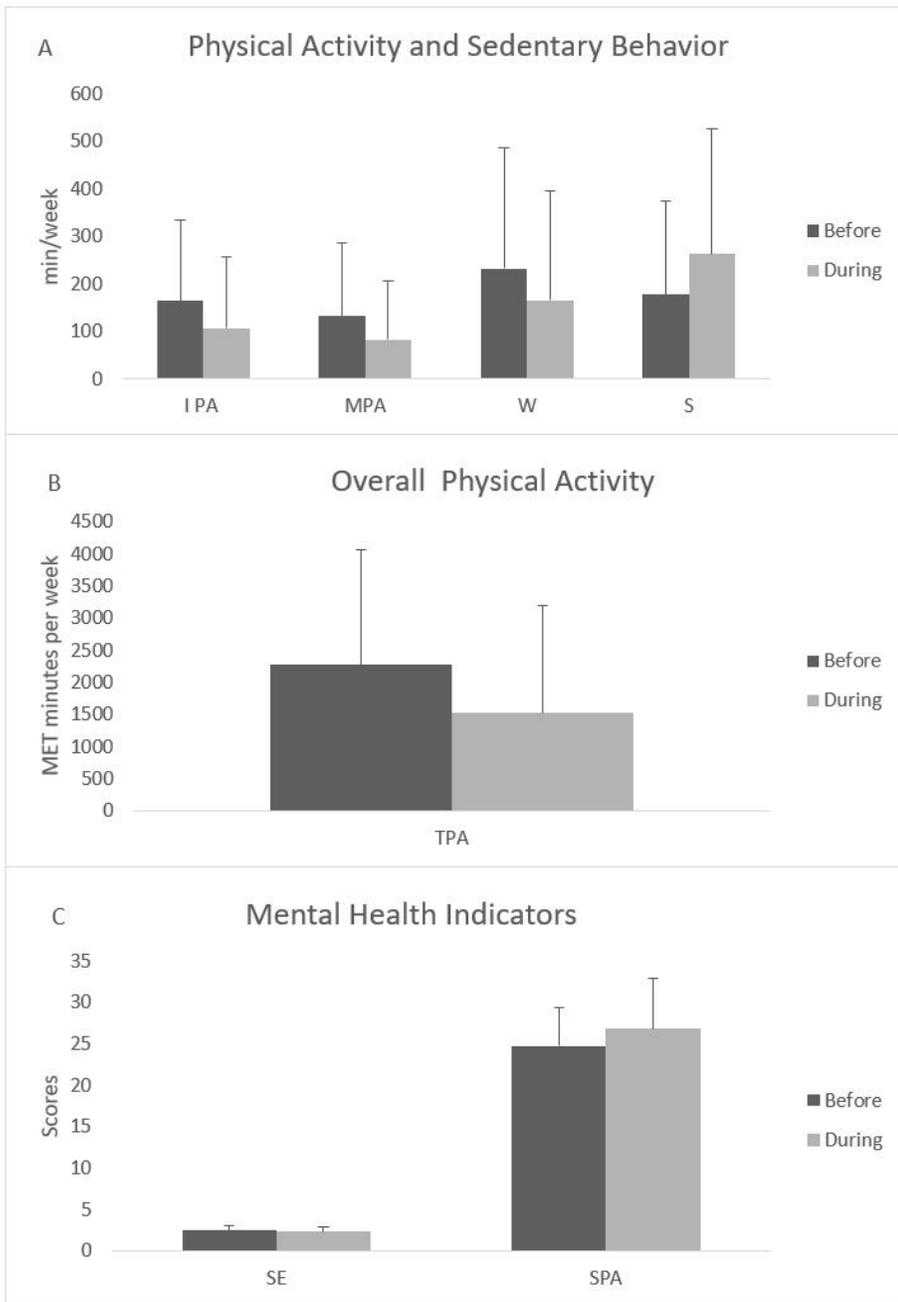
1. Dousari AS, Moghadam MT, Satarzadeh N. COVID-19 (Coronavirus disease 2019): a new coronavirus disease. *Infection and drug resistance*. 2020;13:2819.
2. Haddad C, Zakhour M, Haddad R, Al Hachach M, Sacre H, Salameh P. Association between eating behavior and quarantine/confinement stressors during the coronavirus disease 2019 outbreak. *Journal of eating disorders*. 2020 Dec;8(1):1–12.
3. World Health Organization. Coronavirus disease (COVID-19) pandemic; 2021. Available at:[https://www.who.int/emergencies/diseases/novel-coronavirus-2019?gclid=CjwKCAjw3\\_KIBhA2EiwAaAAAlispPNQY3730zJsQg7jVW-kTYXCuhJMEbPwD7ZBDUxz5hnHD-VlsKPRoCpZ0QAvD\\_BwE](https://www.who.int/emergencies/diseases/novel-coronavirus-2019?gclid=CjwKCAjw3_KIBhA2EiwAaAAAlispPNQY3730zJsQg7jVW-kTYXCuhJMEbPwD7ZBDUxz5hnHD-VlsKPRoCpZ0QAvD_BwE)
4. Wong AY, Ling SK, Louie LH, Law GY, So RC, Lee DC, Yau FC, Yung PS. Impact of the COVID-19 pandemic on sports and exercise. *Asia-Pacific journal of sports medicine, arthroscopy, rehabilitation and technology*. 2020 Oct 1;22:39–44.
5. Di Corrado D, Magnano P, Muzii B, Coco M, Guarnera M, De Lucia S, Maldonato NM. Effects of social distancing on psychological state and physical activity routines during the COVID-19 pandemic. *Sport sciences for health*. 2020 Dec;16(4):619–24.
6. Bird JM, Karageorghis CI, Hamer M. Relationships among behavioural regulations, physical activity, and mental health pre-and during COVID–19 UK lockdown. *Psychology of Sport and Exercise*. 2021 Jul 1;55:101945.
7. Iran's Ministry of Health and Medical Education.. Coronavirus disease (COVID-19) pandemic; 2021. Available at: <https://behdasht.gov.ir/>
8. Pedrosa AL, Bitencourt L, Fróes AC, Cazumbá ML, Campos RG, de Brito SB, e Silva AC. Emotional, behavioral, and psychological impact of the COVID-19 pandemic. *Frontiers in psychology*. 2020;11.
9. Cheval B, Sivaramakrishnan H, Maltagliati S, Fessler L, Forestier C, Sarrazin P, Orsholits D, Chalabaev A, Sander D, Ntoumanis N, Boisgontier MP. Relationships between changes in self-reported physical activity, sedentary behaviour and health during the coronavirus (COVID-19) pandemic in France and Switzerland. *Journal of sports sciences*. 2021 Mar 19;39(6):699–704.
10. Di Fronso S, Costa S, Montesano C, Di Gruttola F, Ciofi EG, Morgilli L, Robazza C, Bertollo M. The effects of COVID-19 pandemic on perceived stress and psychobiosocial states in Italian athletes. *International Journal of Sport and Exercise Psychology*. 2020 Aug 6:1–3.
11. Segrin C, Rynes KN. The mediating role of positive relations with others in associations between depressive symptoms, social skills, and perceived stress. *Journal of Research in Personality*. 2009 Dec 1;43(6):962–71.

12. Lima CK, de Medeiros Carvalho PM, Lima ID, de Oliveira Nunes JV, Saraiva JS, de Souza RI, da Silva CG, Neto ML. The emotional impact of Coronavirus 2019-nCoV (new Coronavirus disease). *Psychiatry research*. 2020 May 1;287:112915.
13. Xiang YT, Yang Y, Li W, Zhang L, Zhang Q, Cheung T, Ng CH. Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *The lancet psychiatry*. 2020 Mar 1;7(3):228-9.
14. Pedersen BK, Saltin B. Exercise as medicine—evidence for prescribing exercise as therapy in 26 different chronic diseases. *Scandinavian journal of medicine & science in sports*. 2015 Dec;25:1–72.
15. Amini H, Isanejad A, Chamani N, Movahedi-Fard F, Salimi F, Moezi M, Habibi S. Physical activity during COVID-19 pandemic in the Iranian population: A brief report. *Heliyon*. 2020 Nov 1;6(11):e05411.
16. Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, Rubin GJ. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *The lancet*. 2020 Mar 14;395(10227):912 – 20.
17. Huang Y, Zhao N. Mental health burden for the public affected by the COVID-19 outbreak in China: Who will be the high-risk group?. *Psychology, health & medicine*. 2021 Jan 2;26(1):23–34.
18. Wang Y, Di Y, Ye J, Wei W. Study on the public psychological states and its related factors during the outbreak of coronavirus disease 2019 (COVID-19) in some regions of China. *Psychology, health & medicine*. 2021 Jan 2;26(1):13–22.
19. Hart EA, Leary MR, Rejeski WJ. Tie measurement of social physique anxiety. *Journal of Sport and exercise Psychology*. 1989 Mar 1;11(1):94–104.
20. Hagger MS, Stevenson A. Social physique anxiety and physical self-esteem: Gender and age effects. *Psychology and Health*. 2010 Jan 1;25(1):89–110.
21. Koyuncu M, Tok S, Canpolat AM, Catikkas F. Body image satisfaction and dissatisfaction, social physique anxiety, self-esteem, and body fat ratio in female exercisers and nonexercisers. *Social Behavior and Personality: an international journal*. 2010 May 1;38(4):561 – 70.
22. Hagger MS, Hein V, Chatzisarantis NL. Achievement Goals, Physical Self-Concept, and Social Physique Anxiety in a Physical Activity Context. *Journal of Applied Social Psychology*. 2011 Jun;41(6):1299–339.
23. Bergman YS, Cohen-Fridel S, Shrira A, Bodner E, Palgi Y. COVID-19 health worries and anxiety symptoms among older adults: the moderating role of ageism. *International psychogeriatrics*. 2020 Nov;32(11):1371–5.
24. López-Bueno R, Calatayud J, Ezzatvar Y, Casajús JA, Smith L, Andersen LL, Lopez-Sanchez GF. Association between current physical activity and current perceived anxiety and mood in the initial phase of COVID-19 confinement. *Frontiers in psychiatry*. 2020 Jul 23;11:729.
25. Lee J, Lim H, Allen J, Choi G. Dual mediating effects of conflicts with parents and self-esteem on the relationship between economic status and depression among middle school students since COVID-19. *Frontiers in psychology*. 2021;12:3128.
26. Coopersmith S. *The antecedents of self-esteem*. San Francisco: Freeman; 1967.
27. Zamani Sani SH, Fathirezaie Z, Brand S, Pühse U, Holsboer-Trachsler E, Gerber M, Talepasand S. Physical activity and self-esteem: testing direct and indirect relationships associated with psychological and physical mechanisms. *Neuropsychiatric disease and treatment*. 2016;12:2617.
28. Fineberg NA, Pellegrini L, Wellsted D, Hall N, Corazza O, Giorgetti V, Cicconcelli D, Theofanous E, Sireau N, Adam D, Chamberlain SR. Facing the 'New Normal': How Adjusting to the Easing of COVID-19 Lockdown Restrictions Exposes Mental Health Inequalities. *Journal of Psychiatric Research*. 2021 September 26:141:276–286.
29. Rogowska AM, Pavlova I, Kuśnierz C, Ochnik D, Bodnar I, Petrytsa P. Does physical activity matter for the mental health of university students during the COVID-19 pandemic?. *Journal of Clinical Medicine*. 2020 Nov;9(11):3494.
30. Smith L, Jacob L, Butler L, Schuch F, Barnett Y, Grabovac I, Veronese N, Caperchione C, Lopez-Sanchez GF, Meyer J, Abufaraj M. Prevalence and correlates of physical activity in a sample of UK adults observing social distancing during

the COVID-19 pandemic. *BMJ Open Sport & Exercise Medicine*. 2020 Jul 1;6(1):e000850.

31. Aghababa A, Sani SH, Rohani H, Nabilpour M, Badicu G, Fathirezaie Z, Brand S. No evidence of systematic change of physical activity patterns before and during the Covid-19 pandemic and related mood states among Iranian adults attending team sports activities. *Frontiers in psychology*. 2021;12.
32. Craig CL, Marshall AL, Sjöström M, Bauman AE, Booth ML, Ainsworth BE, Pratt M, Ekelund UL, Yngve A, Sallis JF, Oja P. International physical activity questionnaire: 12-country reliability and validity. *Medicine & science in sports & exercise*. 2003 Aug 1;35(8):1381-95.
33. Hagströmer M. Assessment of health-enhancing physical activity at population level. *Biovetenskaper och näringslära/Biosciences and Nutrition*; 2007 Sep 28.
34. Ainsworth BE, Haskell WL, Whitt MC, Irwin ML, Swartz AM, Strath SJ, O'Brien WL, Bassett DR, Schmitz KH, Emplaincourt PO, Jacobs DR. Compendium of physical activities: an update of activity codes and MET intensities. *Medicine and science in sports and exercise*. 2000 Sep 1;32(9; SUPP/1):S498-504.
35. Rosenberg, M. *Society and the Adolescent Self-Image*. Princeton, NJ: Princeton University Press; 1965.
36. Goldsmith RE. Dimensionality of the Rosenberg self-esteem scale. *Journal of social Behavior and Personality*. 1986 Apr 1;1(2):253–264.
37. Motl RW, Conroy DE. The Social Physique Anxiety Scale: Cross validation, factorial invariance, and latent mean structure. *Measurement in physical education and exercise science*. 2001 Jun 1;5(2):81–95.
38. Sáenz-Alvarez P, Sicilia Á, González-Cutre D, Ferriz R. Psychometric Properties of the Social Physique Anxiety Scale (SPAS–7) in Spanish Adolescents. *The Spanish Journal of Psychology*. 2013;16:1–9.
39. Zumbo BD. The simple difference score as an inherently poor measure of change: Some reality, much mythology. *Advances in social science methodology*. 1999;5(1):269–304.
40. Vall-Roqué H, Andrés A, Saldaña C. The impact of COVID-19 lockdown on social network sites use, body image disturbances and self-esteem among adolescent and young women. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*. 2021 Aug 30;110:110293.

## Figures



**Figure 1**

(a) PA indicators such as intense physical activity (IPA; min/week), medium PA (MPA; min/week), waking (W; min/week), and also sedentary indicator means sitting (S; min/week), (b) overall PA (OPA; MET minutes per week), (c) mental health indicators such as self-esteem (SE) and social physique anxiety (SPA). Error bars represent standard deviation.